

# **Data Validation Report**

**Project #69420**

**Peoples Gas-Willow Street/Hawthorn Avenue**

**Water and Soil Vapor Sample Analyses  
Performed by**

**STAT Analysis Corporation Chicago, IL**

**Prepared for**



**Prepared by**

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## **1.0 INTRODUCTION**

All data validation was performed by Shepherd Technical Services following US EPA National Functional Guidelines (NFG), where applicable, using electronic deliverables. Guidance and requirements appearing in the NRT Multi-Site Quality Assurance Project Plan, Rev. 2, 2007 ("Multi-Site QAPP") were also used in the validation process.

STAT Analysis Corporation performed the sample analyses on the ground water and soil vapor samples. The laboratory maintains accreditation under the Illinois EPA Environmental Laboratory Accreditation Program (IEPA ELAP #100445). The laboratory is also accredited under the National Environmental Laboratory Accreditation Program (NELAP) by the Oregon Environmental Laboratory Accreditation Program (ORELAP #IL300001).

The laboratories provided all analytical data, including all internal laboratory QC results in an electronic deliverable format to facilitate the validation process.

A total of 19 aqueous samples including 4 field blanks and 16 soil vapor samples were collected June 18, 2013 to July 31, 2013 at the Peoples Gas-Willow Street/Hawthorne Avenue sites. Samples were organized into 15 sample delivery groups (SDGs, or laboratory lot numbers). Samples were organized into eight sample delivery groups (SDG or laboratory lot number) for the groundwater analyses and 7 sample delivery groups for the soil vapor analysis. Samples were analyzed for the indicated parameters using the methods listed in Table 1-1

**Table 1-1. Sample/SDG Cross Reference**

Matrix	Field ID	Lab Sample ID	QC Type	EPA 3C	EPA TO-15	SW-846 6020	SW-846 8260B	SW-846 8270- SIM
Soil Vapor	071713097	13070854-001	(Blank)	X	X			
	071713098	13070854-002	(Blank)	X	X			
	071713099	13070855-001	FD071713099	X	X			
	071713100	13070855-002	FD071713099	X	X			
	071713101	13070856-001	(Blank)	X	X			
	071713102	13070856-002	(Blank)	X	X			
	071913103	13070984-001	(Blank)	X	X			
	071913104	13070982-001	(Blank)	X	X			
	071913105	13070982-002	(Blank)	X	X			
	071913106	13070982-003	(Blank)	X	X			
	071913107	13070982-004	(Blank)	X	X			
	071913108	13070982-005	(Blank)	X	X			
	071913109	13070982-006	FD071913109	X	X			
	071913110	13070982-007	FD071913109	X	X			
	073113111	13071475-001	(Blank)	X	X			
	073113112	13071477-001	(Blank)	X	X			
Ground Water	061813074	13060602-001	(Blank)			X	X	X
	061813075	13060603-001	(Blank)			X	X	X
	061813076	13060604-001	(Blank)			X	X	X
	061813077	13060602-002	trip blanks				X	
	061913078	13060663-001	(Blank)			X	X	X
	061913079	13060663-002	(Blank)			X	X	X
	061913080	13060663-003	(Blank)			X	X	X
	061913081	13060663-004	(Blank)			X	X	X
	061913082	13060663-005	trip blanks				X	
	062013083	13060715-001	(Blank)			X	X	X
	062013084	13060715-002	(Blank)			X	X	X
	062013085	13060715-003	FD062013085			X	X	X
	062013086	13060715-004	FD062013085			X	X	X
	062013087	13060715-005	(Blank)			X	X	X
	062013088	13060715-006	trip blanks				X	
	062113089	13060778-001	MS/MSD			X	X	X
	062113090	13060777-001	(Blank)			X	X	X
	062113091	13060776-001	(Blank)			X	X	X
	062113092	13060776-002	(Blank)			X	X	X
	062113093	13060776-003	(Blank)			X	X	X
	062113094	13060776-004	(Blank)			X	X	X
	062113095	13060776-006	trip blanks				X	
	062113096	13060776-005	(Blank)			X	X	X

## 2.0 INORGANIC DATA REVIEW

### 2.1 Summary

Blank, spiked, and duplicate results were provided. Overall, QC data indicated acceptable precision and accuracy. The results of the QC review are presented below. One method blank was prepared and analyzed with each analytical batch of groundwater samples.

### 2.2 Sample Receipt and Methodology

The aqueous samples were analyzed for inorganic parameters following the methods cited in the table 2-1.

**Table 2-1. Water Inorganic Analytes and Methods Summary**

<i><b>Analytical Method</b></i>	<i><b>Analytes</b></i>
EPA 6020	Metals

Generally, the samples arrived at the laboratories properly preserved and in good condition. All samples were analyzed within the prescribed holding times where holding times have been defined.

### 2.3 Calibration

Initial instrument calibrations for each of the methods were all within acceptance criteria.

All of the initial calibration verification checks (ICVs) for these analyses met the  $\pm 10\%$  acceptance criterion used by the laboratory and required by the methods. No data are qualified as a consequence of the initial calibration verification data.

The laboratory also performed the requisite interference checks (ICS A, ICS AB) with each calibration. All of the interference checks gave acceptable results. Hence, no data are qualified as a consequence of the interference check sample data.

Continuing calibration verification checks were performed at the required frequencies. All of the continuing calibration verification checks (CCVs) for these analyses met the  $\pm 10\%$  acceptance criterion used by the laboratory and required by the methods. No data are qualified as a consequence of the continuing calibration data.

## 2.4 Blanks

On one occasion initial and continuing calibration blanks (ICBs/CCBs) for beryllium gave values slightly above the limit of detection but below the reporting limit. The effected sample did not have any beryllium detected, therefore no samples will be qualified based on this.

Method blanks were prepared for each batch of samples prepared for analysis.

Both batches had analytes in the method blanks that were above the limit of detection but below the reporting limit. The validation guidance provided in the National Functional Guidelines calls for qualifying data between the detection limit and reporting limit as not detected at the reporting limit. The associated samples below the reporting limit will be qualified with a "UJ". Values above the reporting limit will be qualified as estimated ("J").

The method blank results are summarized in Table 2-2.

**Table 2-2. Water Method 6020 Method Blank Results Summary**

<i>Test Batch</i>	<i>Analyte</i>	<i>Units</i>	<i>Result</i>
69988	Antimony	mg/L	0.006 U
	Arsenic	mg/L	0.004 U
	Beryllium	mg/L	<b>0.00113 J</b>
	Copper	mg/L	<b>0.00094 J</b>
	Lead	mg/L	<b>0.00085 J</b>
70095	Antimony	mg/L	0.006 U
	Arsenic	mg/L	0.004 U
	Beryllium	mg/L	0.002 U
	Copper	mg/L	0.01 U
	Lead	mg/L	<b>0.00102 J</b>

## 2.5 Laboratory Control Samples

Laboratory control samples (LCS) were analyzed with each of the data sets.

Laboratory control samples were prepared using commercially available reference materials.

The recovery limits used by the laboratory for LCS results are either those given in the method guidance or are based upon laboratory performance. No results exceeded these criteria; therefore, there is no need to qualify any results based on the LCS results.

Recoveries are given along with the acceptance limits in Tables 2-3.

**Table 2-3. Water Method 6020 Laboratory Control Sample Results Summary**

QC Batch	Analyte	Recovery Limits (%)		Spike (mg/L)	Result (mg/L)	Recovery
		Lower	Upper			
69988	Antimony	80	120	0.25	0.279	112
	Arsenic	80	120	0.5	0.5074	101
	Beryllium	80	120	0.5	0.4637	92.5
	Copper	80	120	0.5	0.5274	105
	Lead	80	120	0.5	0.5164	103
70095	Antimony	80	120	0.25	0.2686	107
	Arsenic	80	120	0.5	0.4848	97
	Beryllium	80	120	0.5	0.4526	90.5
	Copper	80	120	0.5	0.492	98.4
	Lead	80	120	0.5	0.5092	102

## 2.6 Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were evaluated for each of the parameters at appropriate frequencies. On several occasions, the laboratory used non-project specific sample as matrix spike samples to satisfy batch QC requirements. However, only project requested MS/MSD results are included in this report.

Matrix spike/matrix spike duplicate analyses for ICP/MS metals were performed on one of the sample in this data set. The MS and MSD recoveries all fell within the acceptance limits. No samples will be qualified based on the MS/MSD results.

The MS/MSD data are given in Table 2-4.

**Table 2-4. Water Method 6020 MS/MSD Sample Recoveries**

<i>Analyte</i>	<i>MS Sample ID: 062113089</i>			<i>MSD Sample ID: 062113089</i>			<i>RPD</i>	<i>Sample Result (mg/L)</i>	<i>Max RPD</i>
	<i>Spike (mg/L)</i>	<i>MS Result (mg/L)</i>	<i>Rec (%)</i>	<i>Spike (mg/L)</i>	<i>MSD Result (mg/L)</i>	<i>Rec (%)</i>			
Antimony	0.25	0.265	106	0.25	0.2698	108	1.80	0.006 U	20
Arsenic	0.5	0.4903	97.1	0.5	0.507	100	3.35	0.0048	20
Beryllium	0.5	0.4378	87.6	0.5	0.4389	87.8	0.251	0.002 U	20
Copper	0.5	0.433	85.7	0.5	0.4289	84.9	0.951	0.01 U	20
Lead	0.5	0.5259	105	0.5	0.5282	105	0.436	0.002 U	20

## 2.7 Internal Standards

The National Functional Guidelines for Inorganic Data Review, October 2004 requires the relative intensity (%RI) for ICP/MS internal standards to fall within 60-125% for each sample analysis relative to the calibration standards. The internal standards lithium and scandium did not meet this criterion on occasion, but all samples that failed were rerun within the limits. In the event an internal standard in a sample relative intensity is not within the 60-125% limit, the NFG direct the reviewer to qualify the data for those analytes with atomic masses that fall between the atomic mass of the internal standard lighter than the affected internal standard, and the atomic mass of the internal standard heavier than the affected internal standard, or between the limit (upper or lower) of the mass range and the nearest unaffected internal standard. No samples will be qualified based on the fact they were rerun.

## 2.8 ICP/MS Serial Dilutions

Serial dilution tests were performed by the laboratory on an analytical batch basis. However, only one project specific sample from this data set was subject to the serial dilution test.

All serial dilution tests met the acceptance criterion defined in the test method for all of the metals. Consequently no results are qualified due to serial dilution failures.

## 2.9 Field Duplicates

Field duplicates were collected and analyzed for the inorganic parameters. Field duplicates generally show excellent agreement for all of the analytes where the values are above the sample quantitation limit. Precision is only calculated where both the sample and the duplicate sample gave a positive result. Duplicate "NDs", however, are reported with 0% RPDs.

Criteria for evaluating field duplicate precision is provided in the Multi-Site QAPP Addendum dated March 12, 2012. Worksheet #28 of that addendum defines an upper limit of 30% RPD for precision between field duplicate values for inorganic parameters.

Lead gave RPD values exceeding the 30% RPD limit specified in the QAPP Addendum. Therefore both duplicate samples will be qualified as estimated "J".

The results of the duplicate analyses are given in Table 2-5.

**Table 2-5. Method 6020 Field Duplicates Recoveries**

<i>Analyte</i>	<i>Sample ID: 062013085</i>			<i>Sample ID: 062013086</i>			<i>RPD</i>
	<b>Result (mg/L)</b>	<b>Lab Flag</b>	<b>LOQ</b>	<b>Result (mg/L)</b>	<b>Lab Flag</b>	<b>LOQ</b>	
Antimony	0.006	U	0.006	0.006	U	0.006	0.0
Arsenic	0.004	U	0.004	0.004	U	0.004	0.0
Beryllium	0.004	U	0.004	0.002	U	0.002	0.0
Copper	0.01	U	0.01	0.01	U	0.01	0.0
Lead	0.0051		0.002	0.16		0.002	<b>187.6</b>

### 3.0 ORGANIC DATA REVIEW

Blank, spiked, and duplicate results were provided. The results of the QC review are presented below. One method blank was prepared and analyzed with each analytical batch of samples.

Aqueous samples were analyzed for organic compounds following SW-846 Methods as shown in Table 3-1

**Table 3-1. Organic Analytes and Methods Summary**

<b><i>Analytical Method</i></b>	<b><i>Analyte</i></b>
EPA 8260B	Purgeable Volatile Organic Compounds (PVOC)
EPA 8270 by SIM	Polycyclic Aromatic Hydrocarbons (PAH)

#### 3.1 SW-846 Method 8260B – Purgeable Volatile Organic Compounds

##### 3.1.1 Summary

SW-846 Method 8260B employs gas chromatographic separation with a mass spectrometer as a detector.

##### 3.1.2 Trip Blanks

Four trip blanks were provided with this sample set. None of the trip blanks associated with these samples gave results above the detection limit.

No data are qualified as a consequence of any of the field quality control blanks.

In two cases there was a trip blank, with the same ID recorded on multiple chains of custody. In both cases it was logged in and analyzed in only one sample delivery group. Trip blank 062013088 contained headspace in the VOA vial. Since this was a trip blank and results were non detect no data will be qualified based on this.

### 3.1.3 Method Blanks

The aqueous samples were analyzed in multiple analytical batches. One of the batches had ethylbenzene in the method blank above the limit of detection but below the reporting limit. The validation guidance provided in the National Functional Guidelines calls for qualifying data between the detection limit and reporting limit as not detected at the reporting limit. However, none of the associated samples showed any positive values between the detection limit and the reporting limit, thus no data are qualified.

The method blank data are summarized in Table 3-2.

**Table 3-2. Water Method 8260B Method Blank Results Summary**

<i>Test Batch</i>	<i>Analyte</i>	<i>Units</i>	<i>Result</i>
R90366	1,2,4-Trimethylbenzene	mg/L	0.005 U
	1,3,5-Trimethylbenzene	mg/L	0.005 U
	Benzene	mg/L	0.001 U
	Ethylbenzene	mg/L	0.001 U
	Toluene	mg/L	0.005 U
	Xylenes, Total	mg/L	0.015 U
R90539	1,2,4-Trimethylbenzene	mg/L	0.005 U
	1,3,5-Trimethylbenzene	mg/L	0.005 U
	Benzene	mg/L	0.001 U
	Ethylbenzene	mg/L	0.001 U
	Toluene	mg/L	0.005 U
	Xylenes, Total	mg/L	0.015 U
R90552	1,2,4-Trimethylbenzene	mg/L	0.005 U
	1,3,5-Trimethylbenzene	mg/L	0.005 U
	Benzene	mg/L	0.001 U
	Ethylbenzene	mg/L	0.001 U
	Toluene	mg/L	0.005 U
	Xylenes, Total	mg/L	0.015 U
R90573	1,2,4-Trimethylbenzene	mg/L	0.005 U
	1,3,5-Trimethylbenzene	mg/L	0.005 U
	Benzene	mg/L	0.001 U
	Ethylbenzene	mg/L	0.0003 J
	Toluene	mg/L	0.005 U
	Xylenes, Total	mg/L	0.015 U

#### **3.1.4 Calibration**

All initial calibration criteria were met for all compounds. All analytes fit first order linear regression curves and gave average response factors (RFs) with <15% RSD over the average. Therefore average RFs were used in sample quantitation. No data are qualified as a result of the initial calibration data.

For evaluating calibration verifications, the June 2008 CLP National Functional Guidelines have established a  $\pm 40\%$  drift or difference acceptability criterion for analytes known to exhibit poor response and a  $\pm 25\%$  drift or difference criterion for all other target analytes. None of the analytes of concern in this investigation are considered to exhibit poor response. The calibration verification associated with this data set did not exceed the  $\pm 25\%$  difference criterion in place for all other target analytes. Consequently, no data are qualified as a result of the calibration verification data.

#### **3.1.5 Internal Standard Areas**

No sample analyses reported in this data set have internal standard areas less than -50% or greater than +100% of the area response of the corresponding continuing calibration verification. Therefore, no data are qualified.

### 3.1.6 Surrogate Compound Recoveries

Four surrogate compounds, 1,2-dichloroethane- $d_4$ , 4-bromofluorobenzene, toluene- $d_8$ , and dibromofluoromethane, were spiked into each field sample to monitor analyte recovery in the analytical system. The surrogates used by the laboratory are acceptable to measure recovery under EPA SW-846 guidance for this analytical method.

Recoveries for all surrogates for all samples were well within the acceptance limits. No data require qualification based upon surrogate recoveries.

Recoveries for all surrogates for all samples are presented in Table 3-3.

**Table 3-3. Water Method 8260B Surrogate Recoveries**

Lab Sample Number	Field ID	Dilution	1,2-Dichloroethane- $d_4$		4-Bromofluoro benzene		Dibromo fluoromethane		Toluene- $d_8$	
		Limits:	80	120	86	115	86	118	88	110
13060602-001	061813074	1	99.5		94.8		104		101	
13060602-002	061813077	1	108		93.0		102		99.0	
13060603-001	061813075	1	112		97.6		102		102	
13060604-001	061813076	1	99.9		95.0		103		99.1	
13060663-001	061913078	1	102		91.8		106		102	
13060663-002	061913079	1	108		96.7		103		102	
13060663-003	061913080	1	113		95.0		106		101	
13060663-004	061913081	1	110		95.8		106		100	
13060663-005	061913082	1	106		99.2		102		101	
13060715-001	062013083	1	107		98.3		99.5		100	
13060715-002	062013084	1	100		95.1		96.5		98.8	
13060715-003	062013085	1	104		101		96.8		99.2	
13060715-004	062013086	1	112		97.9		98.8		99.8	
13060715-005	062013087	1	106		99.9		101		99.4	
13060715-006	062013088	1	112		94.3		98.4		98.9	
13060776-001	062113091	1	106		98.8		96.7		98.7	
13060776-002	062113092	1	106		98.6		106		99.2	
13060776-003	062113093	1	112		98.7		101		101	
13060776-004	062113094	1	107		98.1		98.6		99.4	
13060776-005	062113096	1	110		96.3		102		99.0	
13060776-006	062113095	1	103		100		102		102	
13060777-001	062113090	1	109		95.2		102		99.1	
13060778-001	062113089	1	106		98.9		107		103	

### 3.1.7 Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed on one sample as specified by the project team in accordance with the Sampling and Analysis Plan. None of the target compounds recovered outside of the limits established by the laboratory.

No action is defined for flagging data based on the MS/MSD results or RPD values alone. Since all of the reported recoveries were within acceptance limits, no data are qualified as a result of the matrix spike/matrix spike duplicate analyses.

The MS/MSD results are summarized in Table 3-4.

**Table 3-4. Water Method 8260B MS/MSD Sample Recoveries**

<i>Analyte</i>	<i>MS Sample ID: 062113089</i>			<i>MSD Sample ID: 062113089</i>			<i>RPD</i>	<i>Sample Result (mg/L)</i>	<i>Max RPD</i>
	<i>Spike (mg/L)</i>	<i>MS Result (mg/L)</i>	<i>Rec (%)</i>	<i>Spike (mg/L)</i>	<i>MSD Result (mg/L)</i>	<i>Rec (%)</i>			
1,2,4-Trimethylbenzene	0.02	0.02212	111	0.02	0.02163	108	2.24	0.005 U	15
1,3,5-Trimethylbenzene	0.02	0.02146	107	0.02	0.02162	108	0.743	0.005 U	15
Benzene	0.02	0.01837	91.8	0.02	0.01905	95.2	3.63	0.001 U	15
Ethylbenzene	0.02	0.02274	114	0.02	0.02186	109	3.95	0.001 U	15
Toluene	0.02	0.01912	95.6	0.02	0.0198	99	3.49	0.005 U	15
Xylenes, Total	0.06	0.06946	116	0.06	0.06693	112	3.71	0.015 U	15

### 3.1.8 Laboratory Control Samples

A Laboratory Control Sample (LCS) analysis was performed for each batch of samples analyzed. None of the analytes recovered outside of the acceptance limits established by the laboratory. No data are qualified due to failed LCS recoveries.

The LCS results are summarized in Table 3-5.

**Table 3-5. Water Method 8260B Laboratory Control Sample Summary**

QC Batch	Analyte	Recovery Limits (%)		Spike (mg/L)	Result (mg/L)	Recovery
		Lower	Upper			
R90366	1,2,4-Trimethylbenzene	70	130	0.02	0.02119	106
	1,3,5-Trimethylbenzene	70	130	0.02	0.02038	102
	Benzene	70	130	0.02	0.02034	102
	Ethylbenzene	70	130	0.02	0.02165	108
	Toluene	70	130	0.02	0.02107	105
	Xylenes, Total	70	130	0.06	0.06661	111
R90539	1,2,4-Trimethylbenzene	70	130	0.02	0.02352	118
	1,3,5-Trimethylbenzene	70	130	0.02	0.02265	113
	Benzene	70	130	0.02	0.01955	97.8
	Ethylbenzene	70	130	0.02	0.02256	113
	Toluene	70	130	0.02	0.01967	98.4
	Xylenes, Total	70	130	0.06	0.07279	121
R90552	1,2,4-Trimethylbenzene	70	130	0.02	0.02276	114
	1,3,5-Trimethylbenzene	70	130	0.02	0.02257	113
	Benzene	70	130	0.02	0.01974	98.7
	Ethylbenzene	70	130	0.02	0.02291	115
	Toluene	70	130	0.02	0.02036	102
	Xylenes, Total	70	130	0.06	0.073	122
R90573	1,2,4-Trimethylbenzene	70	130	0.02	0.02221	111
	1,3,5-Trimethylbenzene	70	130	0.02	0.02155	108
	Benzene	70	130	0.02	0.01895	94.8
	Ethylbenzene	70	130	0.02	0.02126	105
	Toluene	70	130	0.02	0.02008	100
	Xylenes, Total	70	130	0.06	0.0688	115

### 3.1.9 Field Duplicates

Field duplicates generally have good agreement for all of analytes with all RPD values <30%. Precision is only calculated where both the sample and the duplicate sample gave a positive result. Duplicate “NDs”, however, are reported with 0% RPDs. No results will be qualified based on field duplicate data for 8260.

The results of the field duplicate analyses are given in Table 3-6.

**Table 3-6. Water Method 8260B Field Duplicate Results**

<i>Analyte</i>	<i>Sample ID: 062013085</i>			<i>Sample ID: 062013086</i>			<i>RPD</i>
	<b>Result (mg/L)</b>	<b>Lab Flag</b>	<b>LOQ</b>	<b>Result (mg/L)</b>	<b>Lab Flag</b>	<b>LOQ</b>	
1,2,4-Trimethylbenzene	0.005	U	0.005	0.005	U	0.005	0.0
1,3,5-Trimethylbenzene	0.005	U	0.005	0.005	U	0.005	0.0
Benzene	0.001	U	0.001	0.001	U	0.001	0.0
Ethylbenzene	0.001	U	0.001	0.001	U	0.001	0.0
Toluene	0.005	U	0.005	0.005	U	0.005	0.0
Xylenes, Total	0.015	U	0.015	0.015	U	0.015	0.0

## 3.2 SW-846 Method 8270C/SIM–PAHs

### 3.2.1 Summary

SW-846 Method 8270C/SIM employs gas chromatographic separation with mass spectroscopic identification using selected ion monitoring (SIM).

### 3.2.2 Method Blanks

None of the method blanks associated with these sample analyses gave any positive results above the detection limit. Therefore, no data are qualified due to method blank contamination.

The results for the method blanks are summarized in Table 3-7.

**Table 3-7. Water Method 8270-SIM Method Blank Results Summary**

<i>Analyte</i>	<i>Units</i>	<i>QC Batch: 69946</i>	<i>QC Batch: 70020</i>	<i>QC Batch: 70059</i>
2-Methylnaphthalene	mg/L	0.001 U	0.001 U	0.001 U
Acenaphthene	mg/L	0.001 U	0.001 U	0.001 U
Acenaphthylene	mg/L	0.001 U	0.001 U	0.001 U
Anthracene	mg/L	0.001 U	0.001 U	0.001 U
Benz(a)anthracene	mg/L	0.0001 U	0.0001 U	0.0001 U
Benzo(a)pyrene	mg/L	0.0001 U	0.0001 U	0.0001 U
Benzo(b)fluoranthene	mg/L	0.0001 U	0.0001 U	0.0001 U
Benzo(g,h,i)perylene	mg/L	0.001 U	0.001 U	0.001 U
Benzo(k)fluoranthene	mg/L	0.0001 U	0.0001 U	0.0001 U
Chrysene	mg/L	0.0001 U	0.0001 U	0.0001 U
Dibenz(a,h)anthracene	mg/L	0.0001 U	0.0001 U	0.0001 U
Fluoranthene	mg/L	0.001 U	0.001 U	0.001 U
Fluorene	mg/L	0.001 U	0.001 U	0.001 U
Indeno(1,2,3-cd)pyrene	mg/L	0.0001 U	0.0001 U	0.0001 U
Naphthalene	mg/L	0.001 U	0.001 U	0.001 U
Phenanthrene	mg/L	0.001 U	0.001 U	0.001 U
Pyrene	mg/L	0.001 U	0.001 U	0.001 U

### 3.2.3 Calibration

Instrument tuning checks using decafluorotriphenylphosphine (DFTPP) were performed daily and every 12 hours as described in the methods. However, since this method employs selected ion monitoring, tuning using DFTPP has little value. Consequently, no data are qualified based upon DFTPP tuning criteria.

The initial instrument calibration performed for this method gave satisfactory results with response factors over the calibration range <15% RSD. Therefore an average response factor calibration model was used to quantitate all compounds results.

The initial calibration verifications (ICV) reported with this data set gave percent differences less than the 25% limit defined in the National Functional Guidelines for calibration verification. Therefore, no results are qualified as a consequence of the initial calibration verifications.

All of the continuing calibration verification (CCV) checks for PAH analyses performed gave acceptable results (i.e., <25% D using the CLP National Functional Guidelines) for all of the target analytes. No data are qualified as a consequence of the continuing calibration data.

The peak shapes and chromatographic resolution for the isomers benzo(b)fluoranthene and benzo(k)fluoranthene evident in the sample chromatograms for the samples indicate that the two isomers are not adequately resolved to be quantitated separately as the laboratory attempted to do. The laboratory's report narratives noted this issue but stopped short of reporting the two isomers as a coeluting pair (as is done for *m/p*-xylene). Consequently all positive results for benzo(b)fluoranthene and benzo(k)fluoranthene in all samples for these two isomers are qualified as estimated ("J").

### 3.2.4 Internal Standard Areas

No sample analyses reported in this data set have internal standard areas less than -50% or greater than +100% of the area response of the corresponding continuing calibration verification. Therefore, no data are qualified.

### 3.2.5 Surrogate Compound Recoveries

Four surrogates, 1,2-dichlorobenzene- $d_4$ , 2-fluorobiphenyl, nitrobenzene- $d_5$  and terphenyl- $d_{14}$ , were spiked into each field sample to monitor method recovery. Given the focused nature of the compounds of concern (i.e., PAHs), the surrogates reported are adequate to monitor recovery in the analyses. All samples met the criteria for recovery, therefore no samples are qualified based on surrogate recoveries.

The surrogate recoveries for all samples are presented in Table 3-8.

**Table 3-8. Water Method 8270-SIM Surrogate Recoveries**

Lab Sample Number	Field ID	Dilution	1,2-Dichloro benzene- $d_4$		2-Fluoro biphenyl		Nitro benzene- $d_5$		Terphenyl - $d_{14}$	
		Limits:	16	110	43	116	35	114	33	141
13060602-001	061813074	1	72.0		77.2		78.0		78.8	
13060603-001	061813075	1	73.4		67.0		95.2		85.2	
13060604-001	061813076	1	59.0		68.6		68.4		72.6	
13060663-001	061913078	1	61.6		75.8		65.2		77.4	
13060663-002	061913079	1	71.0		81.8		80.4		85.2	
13060663-003	061913080	1	71.0		85.8		84.4		85.6	
13060663-004	061913081	1	63.8		78.2		72.4		84.4	
13060715-001	062013083	1	76.6		84.4		84.4		85.2	
13060715-002	062013084	1	73.8		83.0		84.2		87.4	
13060715-003	062013085	1	71.6		83.0		81.2		81.0	
13060715-004	062013086	1	69.8		79.2		75.6		81.0	
13060715-005	062013087	1	67.4		76.8		77.2		78.4	
13060776-001	062113091	1	73.8		84.4		86.8		87.8	
13060776-002	062113092	1	83.2		94.2		89.2		97.0	
13060776-003	062113093	1	76.8		87.8		83.0		92.8	
13060776-004	062113094	1	71.8		82.2		86.8		85.8	
13060776-005	062113096	1	74.4		91.6		85.4		94.2	
13060777-001	062113090	1	74.8		86.0		85.2		89.4	
13060778-001	062113089	1	70.0		82.2		81.4		91.0	

### 3.2.6 Matrix Spike/Matrix Spike Duplicates

Sample 062113089 was used to perform MS/MSD analyses for 8270-SIM. Guidance in the National Functional Guidelines does not call for qualifying data based upon the matrix spike analyses *alone*. No data are qualified based upon the MS/MSD results.

The MS/MSD recoveries for all samples are presented in Table 3-9.

**Table 3-9. Water Method 8270-SIM MS/MSD Sample Recoveries**

<i>Analyte</i>	<i>MS Sample ID: 062113089</i>			<i>MSD Sample ID: 062113089</i>			<i>RPD</i>	<i>Sample Result (mg/L)</i>	<i>Max RPD</i>
	<i>Spike (mg/L)</i>	<i>MS Result (mg/L)</i>	<i>Rec (%)</i>	<i>Spike (mg/L)</i>	<i>MSD Result (mg/L)</i>	<i>Rec (%)</i>			
2-Methylnaphthalene	0.005	0.00619	124	0.005	0.00605	121	2.29	0.001 U	25
Acenaphthene	0.005	0.00524	105	0.005	0.00495	99	5.69	0.001 U	25
Acenaphthylene	0.005	0.00553	111	0.005	0.0052	104	6.15	0.001 U	25
Anthracene	0.005	0.00533	107	0.005	0.00525	105	1.51	0.001 U	25
Benz(a)anthracene	0.005	0.00548	110	0.005	0.0052	104	5.24	0.0001 U	25
Benzo(a)pyrene	0.005	0.0057	114	0.005	0.00547	109	4.12	0.0001 U	25
Benzo(b)fluoranthene	0.005	0.00599	120	0.005	0.00545	109	9.44	0.0001 U	25
Benzo(g,h,i)perylene	0.005	0.00658 S	132	0.005	0.00631 S	126	4.19	0.001 U	25
Benzo(k)fluoranthene	0.005	0.00559	112	0.005	0.00594	119	6.07	0.0001 U	25
Chrysene	0.005	0.00544	109	0.005	0.00537	107	1.30	0.0001 U	25
Dibenz(a,h)anthracene	0.005	0.00682 S	136	0.005	0.00662 S	132	2.98	0.0001 U	25
Fluoranthene	0.005	0.00564	113	0.005	0.00559	112	0.890	0.001 U	25
Fluorene	0.005	0.00541	108	0.005	0.00507	101	6.49	0.001 U	25
Indeno(1,2,3-cd)pyrene	0.005	0.00695 S	139	0.005	0.00667 S	133	4.11	0.0001 U	25
Naphthalene	0.005	0.00525	105	0.005	0.005	100	4.88	0.001 U	25
Phenanthrene	0.005	0.00516	103	0.005	0.00517	103	0.194	0.001 U	25
Pyrene	0.005	0.00557	111	0.005	0.00551	110	1.08	0.001 U	25

### 3.2.7 Laboratory Control Samples

A laboratory control sample (LCS) was prepared and analyzed with each batch of samples. All of the analytes for the laboratory control samples recovered within the limits used by the laboratory.

The laboratory control sample results are given in Table 3-10.

**Table 3-10. Water Method 8270-SIM Laboratory Control Sample Results Summary**

<i>Analyte</i>	<i>Spike (mg/L)</i>	<i>Recovery Limits (%)</i>		<i>QC Batch: 69946</i>		<i>QC Batch: 70020</i>		<i>QC Batch: 70059</i>	
		<i>Lower</i>	<i>Upper</i>	<i>Result (mg/L)</i>	<i>Rec (%)</i>	<i>Result (mg/L)</i>	<i>Rec (%)</i>	<i>Result (mg/L)</i>	<i>Rec (%)</i>
2-Methylnaphthalene	0.005	50	125	0.0047	94	0.00483	96.6	0.0061	122
Acenaphthene	0.005	50	125	0.00408	81.6	0.00435	87	0.00493	98.6
Acenaphthylene	0.005	50	125	0.00386	77.2	0.0043	86	0.00513	103
Anthracene	0.005	50	125	0.004	80	0.00463	92.6	0.00488	97.6
Benz(a)anthracene	0.005	50	125	0.00391	78.2	0.00448	89.6	0.00494	98.8
Benzo(a)pyrene	0.005	50	125	0.00395	79	0.00436	87.2	0.00501	100
Benzo(b)fluoranthene	0.005	50	125	0.00422	84.4	0.00431	86.2	0.00494	98.8
Benzo(g,h,i)perylene	0.005	50	125	0.00467	93.4	0.00382	76.4	0.00597	119
Benzo(k)fluoranthene	0.005	50	125	0.00432	86.4	0.00489	97.8	0.00549	110
Chrysene	0.005	50	125	0.00406	81.2	0.00433	86.6	0.0048	96
Dibenz(a,h)anthracene	0.005	50	125	0.00498	99.6	0.0046	92	0.00617	123
Fluoranthene	0.005	50	125	0.0042	84	0.00478	95.6	0.00516	103
Fluorene	0.005	50	125	0.0042	84	0.00452	90.4	0.00514	103
Indeno(1,2,3-cd)pyrene	0.005	50	125	0.00508	102	0.00441	88.2	0.00605	121
Naphthalene	0.005	50	125	0.00386	77.2	0.00393	78.6	0.00492	98.4
Phenanthrene	0.005	50	125	0.00384	76.8	0.00429	85.8	0.00486	97.2
Pyrene	0.005	50	125	0.00417	83.4	0.00459	91.8	0.00516	103

### 3.2.8 Field Duplicates

Field duplicates generally show good agreement for all of the analytes. Precision is only calculated where both the sample and the duplicate sample gave a positive result (NC=Not Calculated). Duplicate “NDs”, however, are reported with 0% RPDs. No results for any field samples associated with these duplicate pairs are qualified based upon field duplicate data.

The results of the duplicate analyses are given in Table 3-11.

**Table 3-11. Water Method 8270-SIM Field Duplicate Results**

<i>Analyte</i>	<i>Sample ID: 062013085</i>			<i>Sample ID: 062013086</i>			<i>RPD</i>
	<b>Result (mg/L)</b>	<b>Lab Flag</b>	<b>LOQ</b>	<b>Result (mg/L)</b>	<b>Lab Flag</b>	<b>LOQ</b>	
2-Methylnaphthalene	0.001	U	0.001	0.001	U	0.001	0.0
Acenaphthene	0.001	U	0.001	0.001	U	0.001	0.0
Acenaphthylene	0.001	U	0.001	0.001	U	0.001	0.0
Anthracene	0.001	U	0.001	0.001	U	0.001	0.0
Benz(a)anthracene	0.0001	U	0.0001	0.0001	U	0.0001	0.0
Benzo(a)pyrene	0.0001	U	0.0001	0.0001	U	0.0001	0.0
Benzo(b)fluoranthene	0.0001	U	0.0001	0.0001	U	0.0001	0.0
Benzo(g,h,i)perylene	0.001	U	0.001	0.001	U	0.001	0.0
Benzo(k)fluoranthene	0.0001	U	0.0001	0.0001	U	0.0001	0.0
Chrysene	0.0001	U	0.0001	0.0001	U	0.0001	0.0
Dibenz(a,h)anthracene	0.0001	U	0.0001	0.0001	U	0.0001	0.0
Fluoranthene	0.001	U	0.001	0.001	U	0.001	0.0
Fluorene	0.001	U	0.001	0.001	U	0.001	0.0
Indeno(1,2,3-cd)pyrene	0.0001	U	0.0001	0.0001	U	0.0001	0.0
Naphthalene	0.001	U	0.001	0.001	U	0.001	0.0
Phenanthrene	0.001	U	0.001	0.001	U	0.001	0.0
Pyrene	0.001	U	0.001	0.001	U	0.001	0.0

#### 4.0 VAPOR SAMPLE ANALYSES

Soil vapor phase samples were collected as part of this investigation. Blank, laboratory control sample, and duplicate results were provided. The results of the QC review are presented below. One method blank was prepared and analyzed with each analytical batch of samples. Ultra High Purity nitrogen was used as the matrix for VOC method blank analysis.

Vapor phase samples were analyzed for organic compounds following the methods as shown in Table 4-1.

**Table 4-1. Vapor Phase Analytes and Methods Summary**

<i><b>Analyte</b></i>	<i><b>Analytical Method</b></i>
Volatile Organic Compounds (VOCs)	EPA Method TO-15
Oxygen, Carbon Dioxide, Methane	ASTM D1946/EPA Method 3C

All samples were collected in SUMMA polished canisters and received by the laboratory in good condition and intact. No data are qualified based upon sample receipt conditions.

All sample analyses were performed within the EPA-established holding times. No data are qualified based upon sample holding times.

## 4.1 EPA Method TO-15: Volatile Organic Compounds (VOCs)

### 4.1.1 Summary

EPA Method TO-15 employs gas chromatographic separation with a mass spectrometer as a detector.

### 4.1.2 Method Blanks

The samples were analyzed in several analytical batches. 1,2,4-Trichlorobenzene and methylene chloride were detected in all the method blanks above the limit of detection but below the reporting limit. 1,2,4-Trichlorobenzene was not detected in any of the sample so no results need to be qualified. All positive results for methylene chloride will be qualified as estimated "J".

The results for the method blanks are summarized in Table 4-2.

**Table 4-2. EPA TO-15 Method Blank Summary**

<i>Analyte</i>	<i>Units</i>	<i>QC Batch: R91414</i>	<i>QC Batch: R91519</i>	<i>QC Batch: R91742</i>
1,1,1-Trichloroethane	µg/m <sup>3</sup>	1.1 U	1.1 U	1.1 U
1,1-Dichloroethane	µg/m <sup>3</sup>	0.8 U	0.8 U	0.8 U
1,2,4-Trichlorobenzene	µg/m <sup>3</sup>	<b>0.5937 J</b>	<b>0.4453 J</b>	<b>0.5195 J</b>
2-Butanone	µg/m <sup>3</sup>	1.5 U	1.5 U	1.5 U
Acetone	µg/m <sup>3</sup>	4.8 U	4.8 U	4.8 U
Benzene	µg/m <sup>3</sup>	0.6 U	0.6 U	0.6 U
Carbon disulfide	µg/m <sup>3</sup>	0.62 U	0.62 U	0.62 U
cis-1,2-Dichloroethene	µg/m <sup>3</sup>	0.8 U	0.8 U	0.8 U
Ethylbenzene	µg/m <sup>3</sup>	0.9 U	0.9 U	0.9 U
Methylene chloride	µg/m <sup>3</sup>	<b>1.042 J</b>	<b>1.32 J</b>	<b>2.015 J</b>
Naphthalene	µg/m <sup>3</sup>	0.26 U	0.26 U	1 U
Styrene	µg/m <sup>3</sup>	0.9 U	0.9 U	0.9 U
Tetrachloroethene	µg/m <sup>3</sup>	1.4 U	1.4 U	1.4 U
Toluene	µg/m <sup>3</sup>	0.8 U	0.8 U	0.8 U
trans-1,2-Dichloroethene	µg/m <sup>3</sup>	0.8 U	0.8 U	0.8 U
Vinyl chloride	µg/m <sup>3</sup>	0.5 U	0.5 U	0.5 U
Xylenes, Total	µg/m <sup>3</sup>	2.6 U	2.6 U	2.6 U

#### **4.1.3 Calibration**

The initial instrument calibration performed for this method gave satisfactory results with response factors over the calibration range <30% RSD. Therefore an average response factor calibration model was used to quantitate all target analyte results.

All of the initial calibration verification (ICV) and continuing calibration verification (CCV) checks for Method TO-15 performed gave acceptable results (i.e., <30%D) for all of the target analytes.

No data are qualified as a consequence of the calibration data.

#### **4.1.4 Surrogate Compound Recoveries**

Surrogate Compound analysis is not included as part of EPA Method TO-15.

#### 4.1.5 Laboratory Control Samples

A laboratory control sample (LCS) was prepared and analyzed with each batch of samples.

All of the target analytes for all of the laboratory control samples recovered within the limits used by the laboratory, except one methylene chloride. Sample 073113111 will be qualified for methylene chloride as estimated "J". All other samples associated with this LCS are below the detection limit.

The laboratory control sample results are given in Table 4-3.

**Table 4-3. EPA TO-15 Laboratory Control Sample Summary**

Analyte	Spike ( $\mu\text{g}/\text{m}^3$ )	Recovery Limits (%)		QC Batch: R91414		QC Batch: R91519		QC Batch: R91742	
		Lower	Upper	Result ( $\mu\text{g}/\text{m}^3$ )	Rec (%)	Result ( $\mu\text{g}/\text{m}^3$ )	Rec (%)	Result ( $\mu\text{g}/\text{m}^3$ )	Rec (%)
1,1,1-Trichloroethane	27.28	70	130	29.84	109	31.15	114	29.63	109
1,1-Dichloroethane	20.24	70	130	21.45	106	21.53	106	21.65	107
1,2,4-Trichlorobenzene	37.11	70	130	38	101	36.96	98.4	34.95	92.8
2-Butanone	14.75	70	130	15.57	106	16.25	110	15.72	107
Acetone	11.88	70	130	11.47	96.6	11.71	98.6	12.14	102
Benzene	15.97	70	130	16.23	102	16.39	103	16.45	103
Carbon disulfide	15.57	70	130	14.45	92.8	14.7	94.4	15.6	100
cis-1,2-Dichloroethene	19.82	70	130	21.97	111	21.97	111	21.97	111
Ethylbenzene	21.71	70	130	21.88	101	21.62	99.6	21.62	99.6
Methylene chloride	17.37	70	130	21.12	116	23.55	128	28.59 S	153
Naphthalene	26.21	70	130	33.44	128	32.76	125	30.77	117
Styrene	21.3	70	130	23.26	109	23.17	109	22.58	106
Tetrachloroethene	33.91	70	130	32.76	96.6	31.33	92.4	31.33	92.4
Toluene	18.84	70	130	19.63	104	19.78	105	19.74	105
trans-1,2-Dichloroethene	19.82	70	130	21.29	107	21.25	107	21.33	108
Vinyl chloride	12.78	70	130	13.39	105	14.62	114	13.93	109
Xylenes, Total	65.13	70	130	67.47	104	68.95	106	66.91	103

#### 4.1.6 Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses are not performed for EPA Method TO-15 analyses.

#### 4.1.7 Field Duplicates

Field duplicates generally show good agreement with RPD <30% for all but one of the analytes. Precision is only calculated where both the sample and the duplicate sample gave a positive result (NC=Not Calculated). Duplicate “NDs”, however, are reported with 0% RPDs.

In one of the field duplicate pairs three RPD values were in excess of the 30% RPD limit published in the Multi-Site QAPP Addendum. Hence, values for acetone, methylene chloride and total xylenes in samples 071913109 and 071913110 will be qualified as estimated (“UJ”, “J”).

The results of the duplicate analyses are given in Table 4-4.

**Table 4-4. EPA TO-15 Field Duplicate Sample Summary 071713099**

<i>Analyte</i>	<i>Sample ID: 071713099</i>			<i>Sample ID: 071713100</i>			<i>RPD</i>
	<i>Result (µg/m3)</i>	<i>Lab Flag</i>	<i>LOQ</i>	<i>Result (µg/m3)</i>	<i>Lab Flag</i>	<i>LOQ</i>	
1,1,1-Trichloroethane	2	U	2	2	U	2	0.0
1,1-Dichloroethane	1.5	U	1.5	1.4	U	1.4	0.0
1,2,4-Trichlorobenzene	2.8	U	2.8	2.7	U	2.7	0.0
2-Butanone	2.8	U	2.8	2.7	U	2.7	0.0
Acetone	8.9	U	8.9	8.7	U	8.7	0.0
Benzene	13		1.1	13		1.1	0.0
Carbon disulfide	3.8		1.2	4		1.1	5.1
cis-1,2-Dichloroethene	1.5	U	1.5	1.4	U	1.4	0.0
Ethylbenzene	1.7	U	1.7	1.6	U	1.6	0.0
Methylene chloride	13	U	13	12	U	12	0.0
Naphthalene	2.3		0.48	2.6		0.47	12.2
Styrene	1.7	U	1.7	2.1		1.6	21.1
Tetrachloroethene	2.6	U	2.6	2.5	U	2.5	0.0
Toluene	4.1		1.5	4.8		1.4	15.7
trans-1,2-Dichloroethene	1.5	U	1.5	1.4	U	1.4	0.0
Vinyl chloride	0.93	U	0.93	0.9	U	0.9	0.0
Xylenes, Total	4.8	U	4.8	5		4.7	4.1

**Table 4-4. EPA TO-15 Field Duplicate Sample Summary 071913109**

<i>Analyte</i>	<i>Sample ID: 071913109</i>			<i>Sample ID: 071913110</i>			<i>RPD</i>
	Result (µg/m3)	Lab Flag	LOQ	Result (µg/m3)	Lab Flag	LOQ	
1,1,1-Trichloroethane	2.3		2.1	2.3		2	0.0
1,1-Dichloroethane	1.5	U	1.5	1.5	U	1.5	0.0
1,2,4-Trichlorobenzene	2.9	U	2.9	2.8	U	2.8	0.0
2-Butanone	3.1		2.9	2.8	U	2.8	10.2
Acetone	14		9.1	52		8.9	<b>115.2</b>
Benzene	1.1	U	1.1	1.1	U	1.1	0.0
Carbon disulfide	1.2	U	1.2	1.2	U	1.2	0.0
cis-1,2-Dichloroethene	1.5	U	1.5	1.5	U	1.5	0.0
Ethylbenzene	2.2		1.7	1.7	U	1.7	25.6
Methylene chloride	17		13	39		13	<b>78.6</b>
Naphthalene	1.1		0.49	0.97		0.48	12.6
Styrene	1.7	U	1.7	1.7	U	1.7	0.0
Tetrachloroethene	20		2.7	18		2.6	10.5
Toluene	1.9		1.5	1.5	U	1.5	23.5
trans-1,2-Dichloroethene	1.5	U	1.5	1.5	U	1.5	0.0
Vinyl chloride	0.95	U	0.95	0.93	U	0.93	0.0
Xylenes, Total	13		4.9	4.8	U	4.8	<b>92.1</b>

## 4.2 EPA Method 3C: Oxygen, Carbon Dioxide, and Methane

### 4.2.1 Summary

EPA Method 3C employs gas chromatographic separation with thermal conductivity detector.

### 4.2.2 Method Blanks

The samples were analyzed in several analytical batches. None of the target compounds were detected in the method blanks.

No data are qualified due to the blank contamination.

The results for the method blanks are summarized in Table 4-5.

**Table 4-5. EPA Method 3C Method Blank Summary**

<i>Parameter</i>	<i>Batch</i>	<i>Units</i>	<i>Result</i>
Carbon Dioxide	R91466	mol %	0.08 U
	R91484	mol %	0.08 U
	R91485	mol %	0.08 U
	R91713	mol %	0.08 U
Methane	R91466	mol %	0.1 U
	R91484	mol %	0.1 U
	R91485	mol %	0.1 U
	R91713	mol %	0.1 U
Oxygen	R91466	mol %	0.8 U
	R91484	mol %	0.8 U
	R91485	mol %	0.8 U
	R91713	mol %	0.8 U

### 4.2.3 Calibration

The initial instrument calibration performed for this method gave satisfactory results with response factors over the calibration range <10% RSD.

Therefore an average response factor calibration model was used to quantitate all target analyte results. Just as a note the calibration for this analysis was preformed over a year ago but calibration checks were still within acceptable range.

All of the initial calibration verification (ICV) and continuing calibration verification (CCV) checks for Method 3C performed gave acceptable results (i.e., <10%D) for all of the target analytes.

No data are qualified as a consequence of the calibration data.

#### 4.2.4 Surrogate Compound Recoveries

Surrogate Compound analysis is not included as part of EPA Method 3C.

#### 4.2.5 Laboratory Control Samples

A laboratory control sample (LCS) was prepared and analyzed with each batch of samples.

All of the target analytes for each of the laboratory control samples recovered within the limits used by the laboratory. Based upon the acceptable recoveries, there is no need to qualify data based upon the LCS recovery results.

The laboratory control sample results are given in Table 4-6.

**Table 4-6. EPA Method 3C Laboratory Control Sample Summary**

<i>Analyte</i>	<i>Spike (mol %)</i>	<i>Recovery Limits (%)</i>		<i>QC Batch: R91466</i>		<i>QC Batch: R91484</i>		<i>QC Batch: R91485</i>		<i>QC Batch: R91713</i>	
		<i>Lower</i>	<i>Upper</i>	<i>Result (mol %)</i>	<i>Rec (%)</i>	<i>Result (mol %)</i>	<i>Rec (%)</i>	<i>Result (mol %)</i>	<i>Rec (%)</i>	<i>Result (mol %)</i>	<i>Rec (%)</i>
Carbon Dioxide	0.6	80	120	0.602	100	0.606	101	0.632	105	0.624	104
Methane	1	80	120	1.004	100	1.002	100	0.992	99.2	0.978	97.8
Oxygen	0.8	80	120	0.822	103	0.778 J	97.2	0.796 J	99.5	0.814	102

#### 4.2.6 Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) analyses are not performed for EPA Method 3C analyses.

#### 4.2.7 Field Duplicates

Field duplicates show excellent agreement with RPD <30% for all the analytes. Precision is only calculated where both the sample and the duplicate sample gave a positive result (NC=Not Calculated). Duplicate “NDs”, however, are reported with 0% RPDs.

Based upon these observations, no results for any field samples associated with these duplicate pairs are qualified based upon field duplicate data.

The results of the duplicate analyses are given in Table 4-7.

**Table 4-7. EPA Method 3C Field Duplicate Sample Summary 071213099**

<i>Analyte</i>	<i>Sample ID: 071713099</i>			<i>Sample ID: 071713100</i>			<i>RPD</i>
	<i>Result (mol %)</i>	<i>Lab Flag</i>	<i>LOQ</i>	<i>Result (mol %)</i>	<i>Lab Flag</i>	<i>LOQ</i>	
Carbon Dioxide	15.4		0.08	14.8		0.08	4.0
Methane	0.496		0.1	0.454		0.1	8.8
Oxygen	2.12		0.8	2.11		0.8	0.5

**Table 4-7. EPA Method 3C Field Duplicate Sample Summary 071913110**

<i>Analyte</i>	<i>Sample ID: 071913109</i>			<i>Sample ID: 071913110</i>			<i>RPD</i>
	<i>Result (mol %)</i>	<i>Lab Flag</i>	<i>LOQ</i>	<i>Result (mol %)</i>	<i>Lab Flag</i>	<i>LOQ</i>	
Carbon Dioxide	2.19		0.08	1.79		0.08	20.1
Methane	0.1	U	0.1	0.1	U	0.1	0.0
Oxygen	14.9		0.8	15.2		0.8	2.0